MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SPECIAL/SUPPLEMENTARY EXAMINATION FOR

DIPLOMA IN HOSPITALITY AND TOURISM MANAGEMENT

DIPLOMA IN ELECTRICAL ENGINEERING

DTM 031: PROBABILITY AND STATISTICS

ECU 0201: MATHEMATICS V

DATE 24/9/2019 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS
Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Define the following terms as used in probability

i) an event (1 mark)
ii) sample space (1 mark)
iii) population (1 mark)

b) There are 100 students in the First year college intake 36 are male and are studying accounting ,9 are male and are not studying accounting ,42 are female and studying accounting 13 are female and are not studying accounting Use this data to deduce the probabilities concerning a student drawn at random and.

i) not accounting (2 marks)

ii) probability accounting given male (2 marks)

c) A company has three production sections s_1, s_2, s_3 which contribute $40\%, 35\%$ and 25% respectively to the total output. The following percentages of faulty units have been observed

$s_1 = 2\%, s_2 = 3\%, s_3 = 4\%$ There is a final check before output is despatched. Calculate the probability a unit found faulty at this at this check has come from s_1 (2 marks)

d) A variable x is distributed under a binomial distribution as shown below

x	1	2	3	4	5	6	7
P(x)	0.073	0.081	0.070	0.215	0.221	0.200	0.140

Calculate

i)$E[X]$ (2 marks)

ii)$E[x^2]$ (2 marks)

iii)$E[x-\mu]^2$ (2 marks)

e) Given that $f(x) = \begin{cases} kx^2 & 0 < x < 2 \\ 0 & elsewhere \end{cases}$

i) calculate the value of k (2 marks)

ii) Evaluate

$p(x \geq 1)$ (2 marks)

$p\left(\frac{1}{4} \leq x \leq \frac{1}{2}\right)$ (2 marks)

$p(1 \leq x \leq 2)$ (2 marks)

QUESTION TWO (20 MARKS)

a) The average marks obtained in a class of 20 students in an examination were as follows

51 43 30 36 42

40 27 31 61 57

74 64 55 42 83

52 50 37 41 71

Determine the mean mark and the median (10 marks)

b) Three types of seeds are planted with the chances of growth of

$\frac{1}{8}$ $\frac{1}{5}$ $\frac{1}{10}$ what is the probability that

i) they will all grow (3 marks)

ii) only one type grows (2 marks)

iii) at least one type grows (5 marks)

QUESTION THREE (20 MARKS)

a) Calculate the Q_1 , Q_3 , D_3 , P_{40} of the data provided below

marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
students	2	7	21	25	30	35	28	12

(10 marks)

b) Calculate the median of the data below

marks	0-10	10-20	20-30	30-40	40-50	50-60
	2	18	30	45	35	20

(5 marks)

c) A sample of 5 fathers and their eldest sons gave the following data about their weights in kilogrammes

Father (x)	65	60	67	63	74
Son (y)	49	45	57	40	60

Calculate the spearman's rank correlation coefficient. (5 marks)

QUESTION FOUR (20 MARKS)

The table below shows the number of motor vehicle parts produced per hour by a machine on 60 different occasions

65 85 80 83 70 95 85 79 68 74

82 70 92 61 78 85 86 96 73 76

97 74 82 76 82 68 93 63 81 77

78 66 98 77 81 78 86 65 78 64

62 99 87 90 68 73 87 62 84 79

96 81 72 94 62 66 94 70 82 61

a) Group the data into a frequency distribution table using classes

$(60-64), (65-69)$ …… ……..

b) Hence determine using an assumed mean of 82,

i) Mean
ii) Median
iii) Standard deviation